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ORGANIZATION OF PROJECT EOLE

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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ORGANIZATION OF PROJECT EOLE

R. Aubiniere

ABSTRACT. A definition of the EOLE project is given along with its organization into subprojects, responsibilities of individual divisions and management personnel and its relations with NASA.

Decision No. 28

Subject: Organization of Project EOLE

The following memorandum cancels and replaces the Project EOLE organizational memorandum published 18 December 1968.

Mr. J. Muller is Project Chief and is responsible for technical relations with NASA insofar as the project is concerned.

The Deputy for the Scientific Program and the sub-project chiefs are named by the Director of Programs and the Plan and the directors of the corresponding Space Centers.

The project officers for systems are named by the division chief charged with development or corresponding operations.

The Director General

/s/ R. Aubiniere

Organization of Project Eole

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Reference: Decision No. 22/CNES/P, 8 April 1969.

This memorandum cancels and replaces the organizational memorandum of 18 December 1968.

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* Numbers in the margin indicate pagination in the foreign text.

1. Definition of the Project

Project EOLE is a flotilla of balloons, maintained at constant altitude, equipped for recording essential parameters of the atmosphere and operating in association with a localization and data collection satellite. This project comes within the scope of existing cooperation between France and the United States.

NASA will supply the launch vehicle and carry out the injection into orbit. CNES*will produce the satellite and the balloons and supply all ground equipment required for release of the balloons, for monitoring of the satellite as well as for collection, transmission and processing of data. CNES will organize and direct operations.

The launch is forecast for 1971, using a circular orbit (approximately 900 km; 50°).

2. Principles of Organization

The responsibility for overall and detailed management of Project EOLE is entrusted to the Toulouse Space Center and the performance of tasks coming from the CNES is shared among the divisions best suited for this purpose.

Each one of the divisions concerned has responsibility for one or several well defined tasks and has available for each major task (hereafter termed "systems") a designated project officer. /2

In each division, the orders and decisions concerning the project follow the usual official channels. The division chiefs and systems project officers (within the scope of specific delegation of authority) are the only persons empowered with project management.

A Project Chief is designated and has complete responsibility for conduct of the project, keeping within official channels and in accordance with valid authority.

He is assisted, in the coordination of tasks, by an intermediate functional

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* National Center for Space Studies (Centre National d'Etudes Spatiales).

level represented by the sub-project chiefs who form an aggregate of closely connected systems and who maintain strong mutual working relationships.

Four sub-projects have been set up for Project EOLE during its production phase:

A. Sub-project "Satellite" (CT)

Project Officer	"Vehicle"
"	"Satellite-ground communications"
"	"Satellite-balloon communications"
"	"Power supply and various equipments"
"	"Integration"
"	"Program"
"	"Testing resources"
"	"Satellite operations"

B. Sub-project "Balloons" (CT)

Project Officer	"Gas bags"
"	"Solar generators"
"	"Batteries"
"	"Electronics"
"	"Sensors"
"	"Antennas"
"	"Integration"
"	"Air Safety"

C. Sub-project "Operations" (CT)

Project Officer	"Release sites"
"	"Operations in Argentina"
"	"Bretigny operation" /3
"	"Data processing"
"	"Foreign affairs"

D. Sub-project "Supplemental Testing" (CT-CB)

Project Officer	"Merchant Marine equipment"
"	"Operations"
"	"Fixed nacelles"
"	"Foreign affairs"

as well as all other project officers for supplemental testing. The chief of sub-project "Supplemental testing" is assisted by a deputy for "Ground equipment."

The sub-project chiefs are selected from the division having the largest share of responsibility among tasks assigned the sub-project.

3. Organization of the Project

An organization plan of the project is provided as an annex.

This organization does not modify the conventional official channels. It sets up functional communications, insofar as the project is concerned, between the chief of the project, chiefs of divisions concerned and the chiefs of sub-projects as well as those project officers designated in the divisions.

It emphasizes the data exchange which is to be made between project management and divisions charged with general monitoring of planning activities and budgets.

4. Responsibilities of the Divisions

Responsibilities given over to the divisions are the following:

4.1. Satellite Division

It is responsible for:

the FR2-CAS-A satellite.

Preliminary research and testing necessary for selection of best technical solutions and for demonstrating project feasibility.

Technical definition, contract negotiation, follow-up and supervision of /4
transactions (costs, delays, adherence to specifications, etc.). The technical research required to effectively supervise and monitor manufacturers.

Integration of the satellite, definition, follow-up and interpretation of tests.

Interfaces with the launch vehicle, firing range, telemetry resources, remote control and localization from ground stations, balloon nacelles.

Tests on the firing range and launch. The logistical organization of the program is carried out under his management by the FU (missile) division which appoints a mission chief.

Technical functioning of the satellite in orbit (stabilization, scientific testing, operational modes).

4.2. Division for Balloons

It is responsible for:

leakproof balloons:

Research, testing and selection of materials.

Specification, manufacture and testing of prototypes and production models of the gas bags.

Organization of test programs for the balloons and exploitation of findings. These programs take place in Pretoria. The Balloons division draws them up and supervises them in the capacity as chief of mission.

Study and specification of folding, packaging and transportation conditions for the gas bags.

Specification of testing methods, implementation and launch of leakproof balloons as well as associated equipment to be installed on site.

balloon fittings:

Means for supporting the payload, valves, flow regulators, etc.

Equipment for radar tracking.

Equipment to ensure destruction of the gas bag (power supplied by the nacelle). /5

Experimental nacelles intended for flight testing balloons and corresponding receiving equipment.

nacelles (electronics and integration) of the balloons:

Technical design and specification of the electronics of balloon nacelles as well as of those components most suited to the climatic conditions or flight safety.

Contracts for prototypes and production items of nacelle electronics.

Mechanical and electrical integration of the complete nacelle.

Technical, climatic and safety tests on complete nacelles and specification of acceptance methods to be used on production items.

Specification of methods and test equipment on the launch site as well as the procedure for handling nacelles during release.

Management of technical tests relating to safety, design and specification of safety standards for on-board equipment (given over to the Satellite division).

Interface of the nacelle with the leakproof balloon and tracking or destruction devices.

4.3. Division for Aerospace Techniques

It is responsible for:

power supplies for nacelles (solar generator and battery);

Design and technical specification of nacelle power supplies which are most suitable for climatic conditions and flight safety.

Contracts for prototypes and production items of power supplies (award of contract, supervision, technical acceptances).

Testing of these equipments and participation in full testing in flight and on the ground.

Specification of the equipment and site test procedures.

4.4. Division for Electronic Techniques

It is responsible for:

the nacelle sensor unit; /6

Design and technical specification of the sensor system and flexible connecting tape which are best suited to climatic conditions and flight safety.

Contracts for prototypes and production items of the sensor unit (award of contract, supervision, technical acceptances).

Testing of this equipment and participation in full testing in flight and on the ground.

Specification of the equipment and site test procedures.

Merchant Marine transponders:

Design and technical specification of Merchant Marine transponders.

Contracts for production of these transponders (award of contract, supervision, technical acceptances, installation on vessels).

Testing of this equipment.

Specification and compilation of procedures for operation and maintenance of these transponders.

fixed nacelles:

Design and technical definition of fixed nacelles (award of contract, supervision, technical acceptances).

Testing of this equipment.

Specification and compilation of procedures for operation and maintenance of these transponders.

This operation has up until now not formed the subject of a design decision. When the latter is made, the selection of the division responsible will again be taken under consideration.

4.5. Division of Electromagnetic Techniques

It is responsible for:

antennas for nacelles:

Design and technical specification of antennas for nacelles.

Contracts for prototypes and production items of this equipment (award of contract, supervision, technical acceptances).

Testing of antennas and participation in full testing in flight and on the ground.

Specification of the equipment and site test procedures. /7

4.6. Division for Ground Equipment

It is responsible for:

launch sites:

Selection of precise locations for installation of sites.

Design, specification and installation of the infrastructure and service equipment of the sites (including local transmissions).

(X)* General specification of operating regulations for sites, personnel strength required, installation planning (technical support contracts).

(X) Instruction of personnel and compilation of operating procedures beginning from tests of operational equipment made in cooperation with the project officers for nacelles and bâlloons.

Industrialization, supply, acceptance and installation of technical equipment for control and operation of gas bags, nacelles and sensors.

corresponding supplies:

Helium.

(X) Acceptance in factory of production items of gas bags, sensors and nacelles in close liaison with the divisions responsible for production items contracts.

(X) Preparation and transportation of sensors and nacelles, transportation of gas bags.

The division furthermore participates in all negotiations with Argentina (or other country) where the sites are installed. It prepares the transfer of its responsibilities to the Operations division charged with operating the sites.

some equipment for additional testing:

Since some additional tests were not specified, it is important for the ES division to be prepared for the responsibilities which it will assume in the

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* NOTE: The items marked (X) form the subject of a progressive transfer of responsibilities between the Satellite Exploitation division (ES) and the Operations division. The ES division is responsible until publication of a memorandum from CB/D making this transfer official.

design and production of equipment intended for additional testing in the future. /8 It does this through the intermediary of a "ground equipment" deputy to the chief of the sub-project "Supplemental Testing." This deputy is kept informed of all research and development activity in progress, participates in meetings and decisions made at the latter and has access to all sub-project components.

In the event that a new additional test is planned, upon publication of the preliminary draft by the Program Management, a supplement to the present memorandum will specify the share and allocation of responsibilities by division.

4.7. Operations Division

It is responsible for:

telemetering, command guidance and localization:

Design and utilization of the network in order to ensure data collection, transmission of remote control signals and localization of the satellite.

Specification, possible purchase and utilization of means of telecommunications required for swift forwarding of data from the satellite and to the Paris-Argentina link.

operation of balloon release sites:

(X)* General specification of operating regulations for sites, personnel strength required, installation planning (technical support contracts).

(X) Instruction of personnel and compilation of operating procedures beginning from tests of operational equipment made in cooperation with the project officers for nacelles, balloons and release sites.

(X) Acceptance in factory of production items of sensors and nacelles in close liaison with divisions responsible for contracts.

(X) Transportation of gas bags.

(X) Preparation and transportation of sensors and nacelles.

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* NOTE: The items marked (X) were entrusted at the initial project stage to the ES division. They form the subject of a progressive transfer of responsibilities between ES and OPS. The Operations division becomes responsible for them beginning from publication of a CB/D memorandum making this transfer official.

Carrying out of balloon release operations.

Under these conditions, the Operations division ensures: /9

the final acceptance in factory entailing transfer of custody of the equipment to CNES. The intermediate inspections made during manufacture, acceptances and detailed tests carried out by sampling techniques are attributed to the divisions charged with the contract.

the packaging and removal of equipment for the purpose of transportation. The packaging intended for the protection of the equipment for storage purposes is the responsibility of the divisions charged with the contract. The same is true for costs which may arise owing to possible storage in plant.

meteorological operations (upon request from the experimenter and taking into account recommendations from the satellite project officer):

Specification, installation and operation of an operations room suitable for the project, including herein possible purchases of equipment intended for this room.

Organization and implementation of operations with balloons (placement and destruction), with the satellite (programming, data collection, localization) and for requirements of air safety.

Operation of the balloon launch sites in the operational phase. (The beginning of this phase is to be specified jointly by the OPS and ES divisions, and, at the latest, two months before satellite launch).

Performance on behalf of the satellite project officer, and on his request, of technological control operations of the satellite.

additional operations:

In cooperation with the experimenter and the technical divisions concerned, a study will be made of arrangements for additional operations (specification of messages, specification of operational links).

Installation of equipment for operations and establishment of required procedures and performance of these operations.

Installation, conditions of utilization and maintenance of fixed nacelles.

4.8. Division for Mathematics and Processing (MT)

It is responsible for:

data processing for meteorology:

Research and development of systems for operational processing of data.

Establishment and operation of data processing programs, preparation of command guidance signals and localization of the satellite. /10

Any research and computations required by other divisions, and more particularly probability research required for the air safety file.

With respect to the experimenter, the task of MT is finished when the balloon situation plot and corresponding numerical data are supplied.

processing for additional experiments:

Establishment and exploitation of programs required for additional operations.

4.9. Division of Foreign Affairs

It is responsible for:

foreign affairs:

Discussion and drawing up of international agreements for the installation of launch sites. The preparation of texts is carried out in agreement with the ES and OPS divisions.

Contact and discussion with national and international institutions outside of the CNES to produce the necessary approvals for flight of balloons and overflight of countries.

Relations with national and international institutions in order to produce agreements for performance of additional experiments (example: Post and Telecommunications for the Merchant Marine).

4.10. Branch for Programs and the Plan

It appoints a deputy for the Scientific program who is responsible for:

the scientific interface:

To ensure that specifications of the experiment are in agreement with the scientific objectives approved by the Committee of Scientific Programs and that the conditions necessary to reach these objectives are studied, chiefly in the field of measurement precision.

To study and propose possible compromises which may have become necessary /11
during carrying out of the project, at the same time respecting the main scientific objectives.

To prepare, together with the chief of project and the scientific director, the technical clauses of conventions relating to the EOLE program, approve these conventions and ensure their management and supervision.

To study, together with the Scientific Director, scientific data processing and the format and mode of communication of the results to other national or foreign institutions.

To monitor, in behalf of the chief of project, the progress of works planned for the purpose of setting up the experiment and scientific processing (PERT chart).

To supervise the progress of analysis of results and their interpretation.

5. Responsibilities of the Scientific Director

The responsibilities of the Scientific Director in project EOLE are specified by the protocol set up between CNES and CNRS*.

Within the scope of project performance, the Scientific Director or his authorized representatives have as their mission:

to define the experiment in precise terms within the scope of scientific objectives approved by the Committee of Scientific Programs.

to define optimum conditions and limiting conditions in order for the experiment to reach its scientific objectives (number of balloons, rate of

* National Center of Scientific Research.

measurements, precision of measurements, duration of experiment, etc.).

to study and define, in cooperation with the division of Mathematics and Processing, the form in which the data are to be supplied for scientific processing.

to study, prepare and carry out scientific processing of data and interpretation of results.

to carry out preparation of the scientific program within the scope of a convention approved and monitored by the Branch for Programs and the Plan.

to set up, in agreement with the chief of project, the planning of operations to be passed on to the Division for Operations. /12

to provide its agreement as to the validity of scientific sensors developed by CNES. For this reason, all research and testing results from the sensors are forwarded to the Scientific Director.

6. Responsibilities of the Chief of Project and Chiefs of Sub-projects

6.1. Responsibilities

The chief of project, assisted by chiefs of sub-projects has as mission:

Management of the Project:

to ensure control and management of the project.

to ensure technical success of the project, due regard for the budgetary envelope provided and adherence to assigned schedules.

to set up overall planning for the project beginning from planning activities set up for each sub-project.

Budget:

to propose a distribution of the budget between the divisions at the beginning of the project as well as possible modifications of this distribution during the project, provided circumstances require it.

to set up the list of estimates of expenses and list of commitments made on the budget of the project, beginning from data supplied by the

divisions and administrative services.

Coordination:

to define interfaces between sub-projects and to be informed as to their regulations.

to constantly verify whether tasks to be carried out have been distributed, and to propose, if necessary, the assignment of a new task to the appropriate division.

to arbitrate controversies between divisions within the limit of its powers, and to submit them to higher arbitration in other cases.

Information: /13

to ensure dissemination of general information to the Branch, the different divisions concerned and the Scientific Director of the project.

For this purpose, the chief of project regularly organizes information conferences devoted to the promotion of one sub-project and compiles a monthly activity report beginning from an activity file set up by the chiefs of sub-projects.

The general EOLE distribution is provided as annex II.

to supply necessary data to the specialized divisions charged with supervision of budgets and planning of projects.

to verify satisfactory exchange of technical data between divisions.

6.2. Relations With NASA

The Chief of Project is responsible for relations with the "Project Manager" appointed by NASA. All correspondence of technical and operational nature concerning the project passes through him.

He can, with the agreement of the Director of the CST*, in precise technical areas, authorize direct correspondence. In this case, he informs NASA, specifies authority granted, and appoints the CNES correspondent. The latter sends the

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* Toulouse Space Center (Centre Spatial de Toulouse).

chief of project a copy of all incoming and outgoing correspondence.

6.3. The Chiefs of Sub-projects

They assist the chief of project who delegates to them the following responsibilities within the scope of tasks allocated their sub-project.

Project Management

to ensure technical success of the sub-project, due regard for budgetary limitations and adherence to assigned schedules.

to set up overall planning for the sub-project beginning from detailed planning reports from the various project officers.

Budget

to set up the sub-project budget by studying budgetary requirements with systems project officers.

to supervise cost commitments and to confirm their conformity with /14
estimates of systems project officers.

to study, as required by circumstances, the requirements of budgetary modifications and propose them to the chief of project and Director of the CST.

to manage the budgetary reserve for risks and bringing costs up to date.

Coordination

to define interfaces between the project officers for systems and to be informed as to their regulation.

to verify that the tasks to be carried out have been well distributed, and propose, if necessary, the assignment of new tasks.

to arbitrate controversies between project officers for systems within the limit of their powers, and to submit them to the chief of project in other cases.

to call a monthly meeting of project officers for systems attended by the chief of project and chiefs of sub-projects.

Information

to verify that information exchange is carried on normally within the sub-project.

to regularly inform the chiefs of other sub-projects on points where interfaces can exist.

to set up a monthly activity file which summarizes current activity (this file can be the monthly meeting report) and disseminate it widely within the sub-project, to other chiefs of sub-projects, to the chief of project and to the CST Director.

to prepare for informational meetings, visits, publications as requested by chief of project.

6.4. Means

The project chief has direct functional authority over the chiefs of sub-projects and the scientific director. He has functional authority over the project officers for systems through the chiefs of sub-projects.

He does not have authority over the personnel of divisions working on the project, the latter is a function of established official channels.

The chiefs of sub-projects have direct functional authority over the project /15
officers for systems of their sub-project. Likewise, they have no authority over personnel of divisions working on the project.

The project officers for systems of the divisions receive from their chief of division specific assignments specifying the scope within which they can make decisions and supply data to the chiefs of sub-projects, to the chief of project and to the other divisions.

The list of these assignments of project officers is supplied the chief of project.

In cases not coming within the competence of these assignments, the chief of project deals with the chief of division or his representative.

A Planning service is placed at the disposal of the chiefs of sub-projects and chief of project for collection and publishing data concerning the budgetary calendar.

The administrative services supply the project chief and chiefs of sub-projects those factors needed to manage the budget.

7. Working Groups

"Air Safety" Working Group

This group, created by the CNES and SGAC*, has the task of recording the different problems connected with air safety, studying the solutions proposed by the specialists and offering solutions capable of being used.

The objective of this group is the setting up of a technical, operational and legal file for the purpose of aiding negotiations which will be undertaken to obtain authorizations for flight and overflight of balloons.

This group meets approximately once a month.

The decisions are taken by the chief of project within the limit of his authority. In other cases, they are submitted to higher authority via official channels.

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* General Secretariat for Civil Aviation (Secrétariat Général à l'Aviation Civile).

ANNEX I

CNES Project Officers

	Chief of Project		J. Muller
Deputy for the Program			O. Carel
Chief of sub-project		Satellite	V. Castan
"	"	Balloons	V. Pene
"	"	Operations	J. Blachon
"	"	Supplemental Testing	R. Lehmann
"	"	Deputy for Ground Equipment (Supplemental Testing)	J. Boloh

Project Officers for Systems

1.	Satellite G.1		R. Angrand
	" G.2		P. Ranvoisy
	" G.3		V. Castan
	" G.4		Bellaton
	" Integration		V. Castan
	Launch program	(X)*	P. Bechereau
	Testing resources		J.M. Lesecq
	Satellite operations		P. Desbourdes
2.	Balloon gas bags		P. Malaterre
	Solar generators		Zarudiansky
	Electronics		-
	Batteries		P. Boulais
	Sensors		J.C. Boutemy
	Antennas		G. Piton
	Integration		R. Cuinet
	Air Safety		A. Dhennin

* NOTE: (X) Mr. Bechereau will be assisted by M. Ploix.

3.	Release sites	J. Boloh
	Operations in Argentina	Caroff
	Bretigny operation	P. Desbourdes
	Data processing	Dargent
	Foreign Affairs	G. Boelle
4.	Merchant Marine equipment	R. Lehmann (CB/ES Correspondent: R. Boloh)
	Merchant Marine Operations	P. Desbourdes
	Fixed nacelles	-
	Foreign Affairs	G. Boelle

"Air Safety" Working Group

Chief of group — F. Pene

Members: G. Boelle
Dargent
R. Cuinet
P. Malaterre
A. Dhennin

The Scientific Director is Professor P. Morel.

ANNEX II

EOLE General Distribution List

P
DG
DS
CT/D
CB/D - RE/D - AF/D - PR/D

(1 copy each)

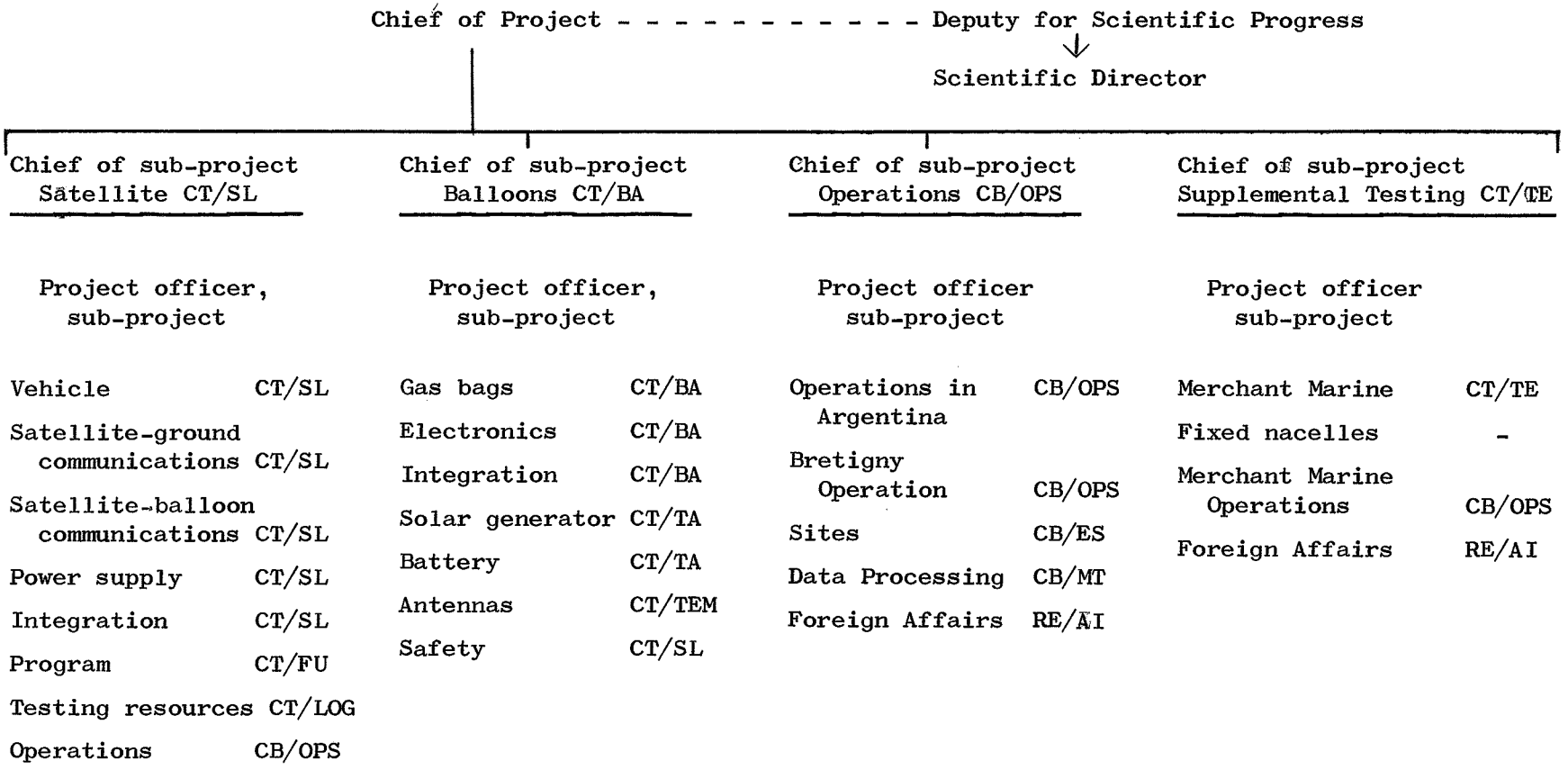
Scientific Director P. Morel (3 copies)

CB/OPS (3 copies)
CB/MT - CB/ES (2 copies)
RE/AI - RE/ID
PR/PS - O. Carel
CT/TA - CT/TE (3 copies)
CT/SL - CT/BA (5 copies)
CT/FU - CT/LOG - CT/TEM (2 copies)

CT/SL
CT/BA (M. Pene)
CB/OPS
CT/TE

ANNEX III

ORGANIZATIONAL PLAN



Abbreviations used in the text

AI	Foreign affairs
CNES	National Center for Space Studies
CST	Toulouse Space Center
ES	Satellite Exploitation
FU	missile
MT	Mathematics and Processing
P & T	Post and Telecommunications
SGAC	General Secretariat for Civil Aviation
CNRS	National Center of Scientific Research
CST	Toulouse Space Center